ROYAL GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

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DCLXI.—JARRAH AND KARRI.

THE use of the two West Australian woods, Jarrah and Karri, especially for wood paving, has been the subject of several articles in the *Kew Bulletin* (1890, pp. 188–190; 1893, pp. 338, 339; 1897, pp. 219–221; and 1899, pp. 72–75).

The demand for these timbers has continuously increased. They are not produced except in the Colony of Western Australia, and the extent of the forests producing them and the consequent available supply are matters of some interest. These points were fully discussed by Mr. J. Ednie-Brown, the Conservator of Forests for the Colony (whose death has, unhappily, recently occurred), in his *Report upon the Forests of Western Australia.* The first edition published in 1896 having been exhausted, a second was issued in 1899. As it is not readily accessible in this country, the following accounts of Jarrah and Karri are extracted from it (pp. 10–15).

It may be noted that the Timber Museum of the Royal Botanic Gardens (No. III.) contains a magnificent log of Jarrah, weighing nearly five tons, which was shown at the Colonial and Indian Exhibition. It also contains a log of Karri exposed between high and low-water mark in Western Australia for 42 years, and still in good condition. This is noteworthy, as it will be seen there is some doubt as to its capacity for resisting decay under such conditions.

"Within the last three years the Colony, from an indefinite and comparatively little-known market, has bounded into a leader of export timber trade with most parts of the world. We are now very large exporters of timber to America, India, the Continent of Europe, and, of course, to Great Britain; and there are signs that before long we shall have considerable dealings in this way with progressive China and Japan.

Over nearly all the world, and more particularly in England, there has arisen a wonderful demand for "Australian Hard Woods," which, to a large extent, means those of Jarrah and Karri; and

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as the trees of these kinds are purely endemic to this Colony, it follows that most of the quotations bearing this name refer only to the timbers of Western Australia. This fact is most satisfactory, and points emphatically to the value of our forests, and how necessary it is that they should be properly looked after by systematic conservation in order to ensure their permanency.

Our timbers from some cause seem to meet the requirements of outside constructive works all over the world, and hence the demand for them. Again, perhaps, the great "run" which is now being made upon the woods of the forests of Western Australia, apart altogether from the fact of their undoubted excellence, is that large quantities of the same kind of tree can be obtained from considerable areas without any material intermixture of other kinds. This fact is, of course, of very great advantage to timber getters, in that it tends to very materially lessen the working expenses of moving machinery, and all the other expenses incurred in connection with the securing of large quantities of one particular kind of timber. Our timber trees are chiefly gregarious. This is, fortunately, particularly the case with the two principal kinds, Jarrah and Karri, although, as a rule, the former is always found forming a sort of fringe to the latter, but never the latter to the former. This peculiarity of specially marked habitats for specific trees is a distinctive feature of the forests of Western Australia, and, as I have already indicated, is one of the points of strength in the disposal of her timbers.

Something over one million acres of forest land have now been leased from the Government for the purpose of acquiring the timber upon them. This is chiefly Jarrah country, and embraces some of the finest forests of that particular kind of tree. It has been taken up in blocks ranging in size from one to over one hundred thousand acres, and, although only a small portion of the whole is as yet being worked, the probabilities in this respect in the near future are immense, and will soon reach fabulous figures. At present there are only some forty saw mills at full work in our forests, but even in connection with these the following interesting figures have been collected :—Strength-power of mills, two thousand five hundred and fifty-four horse-power ; number of all persons employed in connection with the working of the mills, two thousand five hundred and eighty ; number of horses and bullocks employed upon the works, one thousand eight hundred and forty-seven ; and length of private tramways and railways on the various properties, two hundred and fifty miles. Altogether it is calculated that, including their families, there is something like one-thirtieth of the population of the Colony dependent upon the timber industry for its support. This is gradually increasing, so that it will be seen that forests play a very important part in the welfare of the Colony.

A Department of Woods and Forests has now been pretty well established, and its general usefulness as regards the control and management of this enormous natural wealth of the timber resources of the Colony is beginning to be recognized and appreciated by the mass of the people, and of the various individuals and companies directly and indirectly connected with the industry.

Jarrah.

(*Eucalyptus marginata*, Sm.)

This is without doubt the principal timber tree in the Western Australia forests. It is predominant above all others in its extent of forest, the various uses to which it is or can be applied, the part which it is now taking in the great timber export of the Colony, and the esteem in which it is held in the country. Jarrah and Western Australia are almost synonymous words, and, as this has been the case from the earliest days of the foundation of the Colony, so it will remain as long as a Jarrah forest exists. I do not mean by these remarks to disparage in the least degree any of the other commercial woods of the country, but simply to emphasise the fact that Jarrah is the principal indigenous timber of this part of the Australian Continent. There are other timbers in our forests which are equally, if not more, valuable, for their own special purposes, but for general constructive works, necessitating contact with soil and water, the timber of this tree stands foremost.

The specific name (*marginata*) refers to the thickened margin of the leaves, and the vernacular is the name given to the species by the aborigines. In some districts the tree is known to the settlers as the "mahogany gum."

Taken as a whole, there is nothing particularly picturesque about the appearance of a Jarrah tree or forest. Indeed, the general effect of the species *en masse* is dull, sombre, and uninteresting to the eye. Except in special spots and localities, the trees are rugged and decidedly inclined to be straggling and branchy. In this respect they differ very materially from the Karri, which is almost invariably a fine straight tree and comparatively free from branches except at the top. In general appearance the Jarrah resembles what is known in the other colonies as the "stringy-bark." Its likeness to the species of *Eucalyptus* so-called is very marked. The bark is persistent, fibrous, and of a dark grey colour, although more deeply indented in its longitudinal furrows than a true stringy-bark.

It is not uncommon to find considerable areas of Jarrah forest where many of the matured trees attain heights of from 90 feet to 120 feet, with good stems 3 feet to 5 feet in diameter, and 50 feet to 60 feet to the first branch. Such places would be described as first-class Jarrah forest. Taking an average, however, of these forests, I think a Jarrah tree of a good, healthy stamp, and one representing a fair specimen of its kind, would run about 90 feet to 100 feet in height, and from $2\frac{1}{2}$ feet to $3\frac{1}{2}$ feet in diameter at the base. Under such conditons and in fairly favourable situations, trees of this size might be expected to be sound and convertible into good marketable timber without much waste. Of course, in places there are individual trees to be met with the measurements of which run into figures far in excess of those just mentioned, and one or two of these may be cited as indicative of the possibilities of the tree as regards size and wealth of timber. One, about three miles west of the old "Wellington

Mill," upon the "Ferguson River," measured 22 feet in circumference at 5 feet up from the ground, and 80 feet to the first branch. It is a fine, straight, handsome tree, apparently perfectly sound, and would turn out at least 20 loads of good sawn timber. Another large specimen on the "Ferguson" area was 21 feet in circumference at 4 feet from the ground, and 75 feet to the first branch. And yet another, this time in the "Ironpot" area, measured 22 feet in circumference at 4 feet up, and 60 feet to the first limb. These few instances of the actual measurements of large Jarrah trees will show to what an immense size the species will sometimes attain, under what must, of course, be favourable circumstances.

As regards the age of the tree when it has attained a diameter of about 2 feet, or has reached that stage when it may be considered fit for the saw mill, I have gone carefully into this question by having trees cut down and their concentric rings counted, and have come to the conclusion that in good situations it will attain this size when about 40 or 50 years of age.

So far as my observations have extended, the Jarrah is confined in its distribution to what is known as the South-western Division of the Colony, and this, I understand, is practically its geographical limits. This district lies along the western coast of the Colony, between latitudes 31 degrees and 35 degrees south, and longitude 115 degrees and 119 degrees east. This means a stretch of country extending nearly 350 miles running north and south, and from 50 to 100 miles east and west, and embraces all that portion of the country upon which the heaviest rains of the season fall, which measure 40 inches in the south and 35 inches in the north. An average of 10 years shows the rainfall of this, the timbered district of the Colony, as 38 inches.

The Jarrah is purely a semi-coastal tree, by which I mean that it is not found anywhere strictly beyond the influence of the sea, and yet is not at all partial to the direct effects of the sea-breezes. Perhaps the best forests of the species are found from 20 to 30 miles off the coastal line. Whether this fact is only co-existent with the heavy rainfall district, and whether, with an equal rainfall more inland, the result of growth would be equally as good as along the coast, I am not prepared to say.

The principal habitat of the tree is therefore along the tablelands and slopes of the Darling Range, which runs through nearly the whole of the South-western District. Perhaps the best areas of Jarrah lie along that portion of this range from the Blackwood River north to the Helena River, with the choicest portions midway between these two points. In all cases it delights in an ironstone formation, and it would almost appear as though the rougher the site and the more it is composed of ironstone rocks and barren of almost any other vegetation, the better the tree will grow. It is certainly beyond a doubt that, under such circumstances, the timber attains its greatest degree of soundness, strength, and general durability. There are, it is true, some fine belts and patches of Jarrah forest to be found upon many of the lower-lying portions of the district referred to, where the geological formation of these is composed of ironstone, as, for instance, in the country lying between Quindalup and Karridale, the timber is good in every respect.

It is indeed asserted by some and denied by others that the timber grown on the flats is superior in its lasting qualities to that grown on the hills, but this wants further verification before being accepted as a fact. I may, however, state that I have seen some specimens of the timber which had been cut from trees grown on the flats, which were in an apparently sound condition after having been in the ground and water for over 40 years. It is very noticeable that as soon as a granite formation comes in, the Jarrah forest will fall off to a mere scrub, if it does not disappear altogether. This is a well-known fact to those who have travelled through these forests.

The late Baron Sir F. von Mueller, the great and well-known botanist of Victoria, said "the Jarrah is famed for its indestructible wood, which is neither attacked by the borings of the Chelura, Teredo nor Termite." Its resistance to white ants is remarkable, and houses built of the wood when thoroughly seasoned are almost indestructible, and have been known to exist in perfect preservation for nearly 100 years. It gets extremely hard with age, and then becomes almost unworkable, even strong nails cannot be driven into it, and, when struck, the wood rings like a bell. Altogether, it is a remarkable timber and is highly suited for outside works. Should any decay or destruction have occurred in the timber after having been years in use, it will always be found that this is confined to the sap-wood, which therefore ought always to be avoided in the construction of houses or in other works of a permanent character. Unfortunately, sufficient attention is not always paid to the seasoning of the timber, and hence disappointment sometimes ensues. When used as flooring boards, it should be specially seasoned, otherwise there will be much warping, buckling, and an unsatisfactory floor altogether; if seasoned before being laid, however, a better floor could not exist.

The weight of the wood, when newly cut, is a little over 70 lbs. per cubic foot, which is reduced to 60 lbs. when thoroughly seasoned. It is red in colour, polishes well, and is comparatively easily worked.

Some of the principal uses to which it is as yet applied are as follows :—wood-blocking, piles, jetties, bridges, boat-building, posts, furniture and railway sleepers. It makes the best charcoal of any timber in the Colony. Its adaptability for all kinds of out-door work is well known, and hence it is considered the staple timber of Western Australia. The suitability of the timber for piles or any works requiring immersion in salt or fresh water has been practically noted and is worth recording. In this office there are specimens which have been obtained from piles and girders 60 years old. These were driven and used in local harbours and bridges. When obtained for the department, the timber appeared to be perfectly sound and free from any signs of decay whatever; if anything, the wood seemed to be harder, more solid, and apparently more durable than freshly-cut timber. At all events, it seems capable of standing wear and tear for 100 years longer. From its immersion in water, it certainly appeared darker in colour compared with newly-cut timber, but no decay whatever is apparent. Pieces of this wood have been converted

into cups, card cases and other articles, and the polish which they have taken on is equal to, if it does not surpass, the finest old mahogany.

The records of this timber having lasted in the ground as fence-posts are almost without number, and need not therefore be particularised here. There are instances of railway sleepers which were laid down 18 years ago and still appear as sound as ever.

Karri.

(*Eucalyptus diversicolor*, F. Muell.)

This is the giant tree of Western Australia, if not of the whole Australian Continent. The latter remark is, however, disputed, but the assertion is made without much fear of contradiction. It is not so well known as the Jarrah, owing to the limited field of its growth and the, at present, comparative inaccessibility of its haunts.

The late Baron von Mueller was the first to give this tree its specific appellation (*diversicolor*), and this we are told by him bears reference to the paleness of the leaves upon their lower side, compared with eucalypts generally. The common or vernacular name is the aboriginal designation of the tree.

In its young stage it can hardly be beaten as a highly ornamental tree, being regular in its growth, straight and umbrageous, its leaves changing in a few years from oval to the long broad ones which mark its more matured condition. There is no doubt that this is the finest and most graceful tree in the Australian forests. When mature, and attained to large dimensions, its appearance is grand in the extreme, and in this respect at least puts the Jarrah far into the shade. The trees are almost always of straight growth, and tower skywards for great heights without having even the semblance of a branch. So marked are they in these respects that they look like a mass of upright candles. The bark is smooth, yellow-white in appearance, but not persistent like the Jarrah. It therefore peels off in flakes each year, and thus the tree has always a clean bright appearance. In consequence of this it is frequently spoken of as a "white gum," although generally known as the Karri.

The height of these trees is almost phenomenal. As a rule, an average tree may be put down at 200 feet in height, 4 feet in diameter at 3 to 4 feet from the ground, and about 120 to 150 feet to the first branch. Trees of this size are generally sound in every respect, and may be expected to turn out timber free from the usual blemishes of dry rot, gum veins, &c., to which large trees are usually subject. Trees of this size are what one usually meets with in the Karri forests, but much larger specimens are, of course, run against now and again. For instance, on the Warren River, it is not unusual to meet with trees 300 feet in extreme height, over 180 feet in height to the first limb, and from 20 to 30 feet in circumference at the base. Of course, these are exceptional cases, but still they do exist.

The finest tree of this kind which I came across was at Karridale (M. C. Davies & Co.). This is called "King Karri," and the following are some measurements taken in connection with this great specimen :—

34 feet in circumference at 3 feet from the ground.
160 feet to the first branch.
14 feet in circumference at the first limb.
Over 200 feet in extreme height.

From these figures it will be seen that the bole of this tree from the bottom to the first limb contains nearly 6,000 cubic feet of timber. This means a weight of over 40 tons in all ; that it would take one of our ordinary mills at least four days to convert it into sawn stuff ; and it would form about a quarter of the loading capacity of one of the ships which form the fleet of our present export timber trade. These figures speak for themselves. I question if there could be found appliances in the Colony at the present moment to deal with this forest monarch.

The Karri is a very rapid grower and soon attains a great height and considerable dimensions of timber. I had several cut down with the object of counting the concentric rings in the wood, and of making some measurements and observations in regard to the species generally. The following may be taken as an average of these :—

A tree on the road from Giblet's to the Vasse road was felled. It looked like a sapling in comparison with the surrounding members of the forest.

The measurements, however, were :—

Height of whole tree ... ... 153 ft.
Height to top of available timber... ... 100 ft.
Thickness of bark ... ... ½ in.
Diameter at 2 ft. 7 in. from the ground ... 1 ft. 11½ in.
Age of tree, judging from the concentric rings, 35 years.
Contents of tree, say 175 cubic feet of timber.

We thus see that a forest of marketable Karri can be produced in the short term of from 30 to 40 years.

It is certainly a matter of local record that some years ago a resident on the "Warren" lived and partially raised a small family in the hollow of one of these fallen monarchs. It appears that the tree was hollow and fell, and was afterwards further worked out and lined by the enterprising settler as a dwelling for his family until such time as he was in a position to build the modern edifice which now stands not far from the site or remains of the primitive habitation. The old tree was destroyed by a recent bush fire. This specimen was said to be over 300 feet in length and some 12 feet in diameter at the base.

The Karri is strictly confined in its range to the south-western portions of the great South-Western Division of the Colony, or that part lying between Cape Hamelin on the west and the Torbay Estate near Albany on the east. Its geographical area lies within longitudes 115 degrees and 118 degrees east, and latitudes 34 degrees and 35 degrees south. This part of the country comprises the more humid portions of the temperate region of

Western Australia, where the annual rainfall is from 35 to 40 inches, so that one may safely say the tree delights in plenty of moisture. The region is purely coastal, and is very distinct in its general physical features from anything else in this way in the Colony. Here we find immense forests of trees of straight and wonderful size, springing out of a rich soil, deep and spongy. The country is sufficiently undulating to make it in some parts what may be termed hilly, but not difficult of working by road or tram. In some instances we find the tree fairly close to the sea-coast, but in such cases it is scraggy, stag-horned, and branchy, and therefore not desirable for the saw-mill, or readily convertible into timber for marketable purposes. Still it is, undoubtedly, essentially a coastal tree, but yet shy of actual contact with strong direct sea breezes. In this respect it perhaps also resembles the Jarrah, if not the *Eucalyptus* genus generally.

From aneroid readings, I found that the best Karri forests (that is, as regards size, soundness, and health of individual specimens) are to be found at elevations of from 300 to 600 feet above the level of the sea. This I found a fairly correct observation applicable to the whole area.

The timber is red in colour, and has very much the appearance of Jarrah ; indeed, so like are the two, that it takes a good judge to distinguish them. It is hard, heavy, elastic, and tough, but cannot be wrought so easily. For underground or water works the timber is certainly inferior to some other kinds, especially to Jarrah ; there can be no doubt about this fact, which has been demonstrated time after time in the Colony. Still, it is only fair to say that instances have been brought under my notice where posts and slabs of the timber have been known to have been in the ground for 30 and 40 years with only an ordinary amount of decay. This is certainly very puzzling, and makes one doubtful in regard to the conclusions generally which have been arrived at in regard to this timber. However, as may be seen from the comparative tests which have been made in regard to its tensile, crushing, and breaking strength, it is a timber of a very high order. We must, therefore, pending other and more general experiments, look upon the Karri timber as one best suited for superstructural works. For bridge planking, shafts, spokes, felloes, and large planking of any sort, flooring, general waggon work, beams, it is unequalled in this Colony. In lateral strength it is very much stronger than Jarrah ; and for works requiring the bearing of considerable weights, such as bridges, floors, rafters, beams of various kinds, it is of great value. In our railway sheds the wood is now much in use for the construction of waggons of all sorts. It shrinks laterally, but not to any great degree in a longitudinal direction. Altogether the timber is a most valuable one. For street blocking it is most valuable, and for this purpose seems to be equal to, if not better than, the Jarrah, in that its surface, by the wear caused by the traffic, does not render it so slippery for the horses' feet. As is well known, this timber is now largely exported for the London street paving. It is also finding a ready sale in South Africa for mining purposes.

DCLXII.—MAROMBA VINE DISEASE IN PORTUGAL.

The following correspondence relates to a disease which has made its appearance in the North of Portugal. It is undoubtedly serious, but it should be possible to keep it in check if intelligently attacked :—

FOREIGN OFFICE to ROYAL GARDENS, KEW.

THE Under Secretary of State for Foreign Affairs presents his compliments to the Director of the Royal Gardens at Kew, and is directed by the Secretary of State for Foreign Affairs to transmit to him the accompanying paper respecting the vine disease in Portugal.

Foreign Office, July 14, 1899.

(Enclosure.)

HER BRITANNIC MAJESTY'S MINISTER PLENIPOTENTIARY, LISBON, to FOREIGN OFFICE.

MY LORD, Lisbon, July 7, 1899.

I HAVE the honour to report that most disquieting news comes from the vine districts of the North of Portugal in consequence of the ravages of the "Maromba," which has appeared in nearly every vineyard of the Douro region.

The "Maromba" is a parasitic disease, the course of which was noted some four years ago by Monsieur Alfred Lecocq, when it first made its appearance in Portugal in a mild form.

As yet no definite remedy has been hit upon to counteract the evil or prevent its extension, but experiments are being actively made in the district, particularly on the estates belonging to the Crown.

One of the most troublesome features of this disease is that it attacks all classes of vines, including the American, while in some localities it has even affected the chestnut and almond plantations.

I shall endeavour to obtain more detailed information from competent experts.

I have, &c.,

H. G. MACDONELL.

The Marquess of Salisbury, K.G.,
&c., &c., &c.

HER BRITANNIC MAJESTY'S MINISTER PLENIPOTENTIARY, LISBON, to FOREIGN OFFICE.

MY LORD, Lisbon, August 30, 1899.

WITH reference to my despatch, No. 30, Commercial, of the 7th ultimo, and to Your Lordship's despatch, No. 13, Commercial, of the 22nd ultimo, I have the honour to report that the Director of the Portuguese Royal Association of Agriculture has been

able to procure some specimens illustrating the vine disease "Maromba" that has been prevalent in the Douro district for some time.

These specimens have been forwarded to-day by the steamship "Arab" to Southampton, to be transmitted direct to Kew Gardens, and I have informed the Director of their despatch.

Many experiments have recently been made in this country in the hope of discovering a remedy for this disease. The most successful appears to be the use of sulphate of copper, sulphur, and lime, for powdering the vines, but there is great uncertainty as to the best method of treatment.

Should, therefore, these specimens reach Kew Gardens in good condition, it is hoped the Curators will be able to make some experiments, as their opinion on the disease would, I am sure, be greatly valued by the Portuguese Agricultural Society.

I have, &c.,

H. G. MacDonell.

The Marquess of Salisbury, K.G.,
&c., &c., &c.

Report.

The living vine, forwarded to Kew for investigation, arrived in excellent condition, and enabled a thorough microscopic examination, also cultures from various parts to be undertaken.

The result of such examination proves conclusively that the disease is caused by a parasitic fungus, which in the first instance attacks the younger root branches, extending from thence into the thicker branches, and finally attacking the collar of the stem.

The mycelium first appears in the vessels of the root, which not unfrequently become filled with a dense weft of slender colourless hyphae. From thence the mycelium extends to the adjacent tissues, killing the cells and causing a brown colouration of the attacked parts. The contents of cells attacked by the mycelium assume a spherical form, being at first colourless, finally clear brown. These spheres become ruby red when treated with an alcoholic solution of alkannin, and blackish brown with a one per cent. solution of osmic acid, thus proving the oleaginous nature of their composition.

Portions of the root placed in a damp chamber soon became covered with white cottony mycelium, which gradually changed to a brown colour and passed into slender cord-like strands or rhizomorphs.

Numerous fasciculate conidiophores bearing very minute hyaline elliptic conidia were also produced from blackish microsclerotia immersed in the bark of the root.

The higher form of fruit has not been observed, as this is produced only on old and very much decayed portions of diseased plants, hence the name of the fungus cannot be given with certainty; nevertheless the general habit and morphology of the mycelium, its location in the root, the formation of radiating rhizomorphs, the sclerotia, and the conidial form of reproduction

indicate that the fungus under consideration is closely allied to, if not identical with, *Rosellinia necatrix*, Prill. and Del. (*Dematophora necatrix*, Hartig), a parasitic fungus too well known as the cause of a root disease in German and French vineyards.

Rosellinia necatrix possesses the power, attributed to the Maromba fungus, of attacking the roots of almost every kind of plant with which its mycelium comes into contact; and, when once introduced into a given district, it rapidly spreads by means of the underground rhizomorphs, which radiate in all directions in the soil from each root that is attacked.

Preventive measures.—Carbon bisulphide has proved to be a most effective remedy in preventing the spread of subterranean mycelium. Holes are made in the soil about 1 ft. deep, 1 ft. distant from the stem of the vine, and 2 ft. apart laterally; half an ounce of carbon bisulphide is poured into each hole and closed immediately with the foot. The holes are made with an iron rod. This substance, in addition, is the most effective agent known against root-lice, maggots, etc.

Carbon bisulphide is highly inflammable, and should not be exposed in the proximity of a light.

Where the disease is spreading the diseased portion should be isolated by means of a trench about 1 ft. wide and 9 ins. deep. Carbon bisulphide might be used at intervals as described above, on the presumed uninfected side of the trench, as a preventive to the extension of mycelium that may not have been included by the trench.

Weeds should not be allowed to remain, as their roots supply the fungus with food and aid the extension of its mycelium in the soil.

Diseased vines, also other plants, should be promptly removed and burned; if allowed to remain and decay *in situ*, preventive measures are practically of no avail, as mycelium and conidia are being continually produced and diffused from such centres of infection.

Finally good drainage is of primary importance; the underground mycelium extending most rapidly and proving most destructive when stagnant water is present in the soil.

G. M.

The following literature gives additional information on the subject of root-diseases :—

Root Diseases caused by Fungi. *Kew Bulletin*, 1896, pp. 1–5, 1 pl.

P. Viala, *Monographie du pourridié des Vignes*, &c. G. Masson, Boulevard Saint-Germain, 120, Paris.

J. Dufour, Dematophora necatrix. *Chron. Agr. Cant. Vaud.*, 12 (1899), No. 4, pp. 87–90.

G. Massee, *A Text-book of Plant Diseases*. Duckworth & Co., London, 1899.

DCLXIII.—CHINESE PRINTING BLOCKS.

The subject of Chinese printing blocks has for some considerable time engaged the attention of this establishment, and as the Museums have recently become possessed of several examples through the courtesy of Mr. W. R. Carles, Her Majesty's Consul at Foochow, it has been thought of sufficient interest to review the question in the Bulletin of the Royal Gardens, and hopes are entertained that specimens of all the woods and blocks prepared therefrom for this industry, together with dried specimens of the plants to satisfactorily determine their botanical origin, may be forwarded to Kew.

Application was first made to the Foreign Office early in April, 1884, for specimens of blocks prepared from the wood of the well-known Tallow-tree (*Sapium sebiferum*, Roxb.), which was supposed to be used for that purpose, and though the matter was kindly taken up by Mr. Baber, then Chinese Secretary of Her Majesty's Legation at Peking, who issued a memorandum for circulation amongst various of Her Majesty's Consuls in China, no specimens came to hand; later, Dr. A. Henry, to whom the Royal Gardens have become indebted for many interesting and unique donations, drew further attention to the subject in his "Notes on the Economic Botany of China," p. 9, under the heading of "Queries from Kew." Such in brief is the record of an interesting economic subject of which full particulars are detailed in the following correspondence :—

EXTRACT from letter from Royal Gardens, Kew, to Foreign Office, dated April 2nd, 1884.

"The wood of the well-known Tallow-tree (*Sapium sebiferum*, Roxb. Stillingia sebifera, *Michx.*) is one of those said to be used by the Chinese for printing blocks, and Sir J. D. Hooker would be glad if one of Her Majesty's Consular Officers in China could procure specimens of such blocks for the Kew Museum. He would also like to procure printing blocks in which any other kinds of wood have been used if only the nature of these can be authentically determined.

"Sir J. D. Hooker has no means of indicating in what parts of China application for these specimens might be most conveniently made. But he has no doubt that Mr. Baber would assist with his advice as he so kindly did in the case of the enquiries which Earl Granville was pleased to direct should be made in the case of Chinese White Wax."

FOREIGN OFFICE to ROYAL GARDENS, KEW.

SIR, April 24th, 1884.

YOUR letter of the 2nd instant upon the subject of the woods used in China for printing blocks was referred to Mr. E. C. Baber for his observations and suggestions, and I am now directed by Earl Granville to transmit to you the accompanying draft instructions to certain of Her Majesty's Consuls in China which has been drawn up by that gentleman.

I am to request that you will lay this draft before Sir J. Hooker and move him to inform Lord Granville whether it meets with his concurrence.

I am, &c.,
(Signed) PHILIP W. CURRIE.

COPY OF INSTRUCTIONS addressed to Her Majesty's Consuls at Canton, Kiungchow, Fuchow, Tamsui, Shanghai, Hankow, Chungkiang, and Tientsin.

SIR,

THE Director of the Royal Gardens at Kew being desirous of obtaining some accurate information in regard to the woods used in China for printing blocks, I am directed by Earl Granville to request that you will furnish his Lordship with such information on the subject as you may be able to obtain in your Consular District and will forward specimens of blocks for examination.

The wood of the well-known Tallow-tree (*Sapium sebiferum*) is one of those said to be used by the Chinese for this purpose. The Director would be glad if you could procure specimens of blocks of that wood, as well as of any other kinds of wood used in Chinese printing if only the nature of these can be authentically determined or means afforded for their identification. The better to secure the latter object, it would be well to obtain, where possible, dried specimens of the trees themselves which yield the woods, and I am to instruct you to do this where you can.

A copy of printed instructions issued by Kew Gardens for the guidance of collectors is transmitted herewith for your use.

I have, &c.,
(Signed) E. C. BABER.

EXTRACT from letter from W. R. Carles, Esq., to Royal Gardens, Kew, dated Her Majesty's Consulate, Hankow, February 15, 1896 :—

Dr. Henry, in his "Notes on the Economic Botany of China," refers to your wish to obtain specimens of the woods used in China for printing blocks.

The name which the neighbouring city of Wuchang enjoys for the excellence of its printing work has led me to inquire into the woods used there, and I am sending you specimens of them by parcel post.

The wood which is considered the best is the *t'eng li mu*, which has been identified as the *Pyrus betulæfolia*, Bunge., and which grows in this Province. Slabs of this wood 1 ft. × 6 ins. × 1½ in. cost 150 cash, or about 5½*d.*

A cheaper wood generally used for printing proclamations is the *tu chung mu*. *Eucommia ulmoides*, Oliv., has been determined to be the *tu chung mu*. The *tu chung* here used is a native of this Province.

A wood used in Kiangsu is the *yin hsing mu*, which is one of the names of the *Salisburia adiantifolia*.

Boxwood, *huang yang mu*, is obtained from Szechuen, but only in small pieces, which are mainly used for cutting the stamps used for private seals on letters and documents.

In the third volume of the Japanese work, the "So Moku Sei Fu," a drawing is given of the *huang yang*, together with a quotation from the Chinese Materia Medica, which speaks of the tree as growing an inch a year, except in these years which have an intercalary moon, when it grows backwards. From this it would appear to be a slow growing tree.

W. R. CARLES, ESQ., to ROYAL GARDENS, KEW, dated Her Majesty's Consulate, Hankow, July 25th, 1896.

DEAR MR. THISELTON-DYER,

I AM glad to learn from your letter of the 12th May, that the specimens of woods which I sent to you were of interest. I am sending you by post some printing blocks of the two woods (Pyrus and Eucommia), and a little stamp in box-wood.

The blocks have been given me by the Agent of the National Bible Society of Scotland. I think that the block for an illustration of an engine gives a very good idea of the usefulness of the wood.

If you would like to have these specimens further supplemented, I shall be very glad to do what I can.

Yours, &c.,
(Signed) W. R. CARLES.

W. R. CARLES, ESQ., to ROYAL GARDENS, KEW, dated Her Britannic Majesty's Consulate, Foochow, July 11th, 1897.

DEAR MR. THISELTON-DYER,

I AM sending you by post another small parcel of woods used for printers' blocks. Two of them came from Chinkiang, and are, I believe, from a species of Euonymus and *Zizyphus vulgaris*. The others are from this Province, and judging from their names are species of Pyrus. Later on I hope to be able to procure specimens of the flower and leaf of these two, but the others, I am afraid, I have no chance of determining * * *

Yours, &c.,
W. R. CARLES.

The specimens referred to in Mr. Carles' letter, dated Hankow, February 15th, 1896, and received at Kew on April 8th following, consisted of sections of the woods of T'eng li mu (*Pyrus betulæfolia*, Bunge), Tu chung shu (*Eucommia ulmoides*, Oliv.), and Huang yang mu or Boxwood (*Buxus sempervirens*, Linn.)

Further specimens received from Mr. Carles, September 25th, 1896, and described in his letter dated Hankow, July 25th, consisted of another specimen of the wood of T'eng li mu (*Pyrus betulæfolia*, Bunge), together with two engraved blocks of the same wood under the name of Huang li, also an engraved block of *Eucommia ulmoides* sent as Tu chung, and a small engraved seal of Boxwood (*Buxus sempervirens*, Linn.)

The blocks accompanying Mr. Carles' letter, dated Foochow, July 11th last, and received at Kew, August 20th, were as follows :—Two blocks of a species of Euonymus from Chinkiang, one prepared for engraving and the other engraved ready for use,

also a small block of *Zizyphus vulgaris*, from the same locality, and two other engraved blocks from Fukien, namely, *huang li* or Red Pear, which is probably *Pyrus betulafolia*, and *pai li* or White Pear, which so far cannot be identified. It is improbable that it is furnished by a species of *Pyrus*, and may, perhaps, be furnished by a species of *Tilia*.

With the exception of the small Boxwood seal, it is interesting to note that all the other examples are engraved or prepared for engraving either on the tangential or radial surface of the wood. With European engravers the transverse surface is always the one engraved. The Museum contains several Indian stamps or designs for printing cotton cloths, each of which is cut on the transverse surface. None of the Chinese blocks seem to be of specially selected wood, nor, excepting perhaps the Boxwood, to be adapted for fine engraving.

The Chinese word *mu* means wood : *shu* means tree. The *tu chung* determined by Professor Oliver to be *Eucommia ulmoides* is a native of mountainous districts in Hupeh and Szechuan. The same name is applied apparently to a tree of the plains which is almost certainly a Euonymus. It is very improbable that the wood of Eucommia is used for printing blocks at all : the identification is probably an error arising from the name *tu chung* being applied to two different trees. The engraved block sent by Mr. Carles as made from Eucommia is almost certainly the wood of Euonymus. It is possibly identical with *pai ch'a* used largely at Ningpo for carving (see *Kew Report*, 1878, pp. 41, 42), which is now identified with *Euonymus hamiltonianus*, Wall. It is possible also that the wood supposed to belong to *Sapium sebiferum* is the same thing.

DCLXIV.—LUNGAN PULP.

Mr. Consul Kenny in his Report on the Trade of Tainan, Formosa, for the year 1896 [Foreign Office Report, Annual Series, No. 2,021] draws attention to this substance in the following words :—"Lungan is the fruit popularly known as the 'dragon's "eye.' It is prepared in the form of a pulp by peeling and "stoning the fruit and drying and baking it, and is used by the "Chinese as tea." Specimens of the fruit of the Lungan or Longan (*Nephelium Longana*, Cambess.) were already in the Museum collection, but the fruit pulp prepared in the way indicated by Mr. Kenny not being represented, application was made to the Foreign Office to request Her Majesty's Consul at Tainan to procure and forward to Kew specimens of the fruit and prepared pulp. This was accordingly done, specimens being received on September 9th, 1898, from Mr. Ernest A. Griffiths, Acting Consul, Tainan, together with a memorandum on the subject by the Rev. William Campbell, F.R.G.S., Presbyterian Missionary at Tainan, written at the request of Mr. Griffiths, and from which the following notes are gathered :—

The dried Lung-ngan or Geng-Geng, which is largely exported from An-pêng, the port of Tainan, is described as the longan fruit (*Nephelium Longana*). On page 105 of Douglas' Amoy-Vernacular

Dictionary, gêng-gêng is described as the dragon's eye or lung-ngan fruit, geng-a-koa being the dried lung-ngan (Mandarin sound of characters, as gêng-gêng is the local with us in Formosa), which is the article of export.

Natives state that the "lichi" (*Nephelium Litchi*, Cambess.) is not very common in Formosa. It is larger than the lung-ngan or gêng-gêng, has a thinner and much rougher outside husk, and contains more edible matter.

The country of Kagi is a region where much of the gêng-gêng yearly production is prepared for exportation.

The work of first heating the fruit so as to cause the soft part inside to shrink, of peeling the husk, and then of drying the abstracted soft part over a slow fire, is carried on chiefly by women and girls, who earn each about 60 or 80 cash (6–8 cents) a day, besides getting the husks and hard inner nut for use as fuel. The work usually begins about the middle of the eighth month and lasts on till the end of the year. The dried article of export is taken to Shanghai, &c., and is said to be largely used for infusion with water as a refreshing drink or febrifuge.

Lungan pulp consists of the fleshy arillus which surrounds the seed; it is of a black colour and leathery consistency, and has a sweetish smoky flavour and is of an uninviting appearance.

DCLXV.—MISCELLANEOUS NOTES.

Mr. Harold Maxwell Lefroy, B.A., of King's College, Cambridge, has been appointed by the Secretary of State for the Colonies, on the recommendation of Kew, Lecturer in Economic Entomology in connection with the Agricultural Department, West Indies. His services will be generally available for the West Indian Colonies, and his headquarters will be at Barbados. Mr. Lefroy took First Class Honours in the Natural Sciences Tripos in 1898.

Mr. William R. Buttenshaw, M.A., B.Sc., Aberdeen, has been appointed by the Secretary of State for the Colonies, on the recommendation of Kew, Lecturer in Agriculture for Jamaica.

The Department of Agriculture of the University of Aberdeen was organized three years ago, and Mr. Buttenshaw was the first student to obtain the B.Sc. degree in it.

Mr. F. A. Lodge, a Deputy Conservator in the Madras Forest Department, has been selected by the Secretary of State for the Colonies, with the sanction of the Secretary of State for India, to proceed to Trinidad and furnish a full report and recommendations on the question of forest conservancy.

Mr. Thomas William Brown, formerly a member of the Gardening Staff of the Royal Botanic Gardens and late Acting Curator of the Botanic Station at Aburi, Gold Coast (*Kew Bulletin*, 1899, p. 50), has been appointed Assistant Curator.

Mr. Bernard Cavanagh, a member of the Gardening Staff of the Royal Botanic Gardens, has been appointed, on the recommendation of Kew, Superintendent of the Gardens of the Agri-Horticultural Society, Madras, in succession to Mr. J. M. Gleeson, deceased.

Mr. Henry Harold Welch Pearson, B.A., Assistant (for India) in the Herbarium of the Royal Botanic Gardens, has been awarded the Walsingham Gold Medal of the University of Cambridge for his account of "The Botany of the Ceylon Patanas," published in the *Journal of the Linnean Society* (Botany), vol. xxxiv., pp. 300–365.

Professor Francis Guthrie, Ll.B., B.A.—The death of this distinguished South African man of science, on October 19 last, at Cape Town, deserves a brief record.

Born in London, in 1831, he graduated with honours in the University. He was called to the Bar and engaged in Chancery practice. In 1861 he was appointed to the Chair of Mathematics in Graaf-Reinet College, which he resigned in 1876 for a similar Chair in the South African College. He retired in 1898.

A pupil of the celebrated Lindley, he devoted himself to the study of the flora of his adopted country. He had latterly been engaged with the well-known South African botanist, Harry Bolus, in an elaboration of the *Ericaceæ* for the fourth volume of the *Flora Capensis*, of which the continuation is now in course of preparation at Kew.

Sir Rawson William Rawson, K.C.M.G., C.B.—Sir Rawson Rawson, who died on November 20, 1899, at the age of 88, was one of the many Colonial Governors who have done good service to Kew and botanical science. He was, perhaps, more eminent as a statistician and geographer than a botanist, but he was joint author, with Dr. L. Pappe, of a *Synopsis Filicum Africæ Australis*, published at Cape Town in 1858. He had, before proceeding to South Africa, made a study of ferns. Sir R. Rawson was appointed Colonial Secretary at the Cape in 1854, and ten years later Governor of the Bahamas, and subsequently of the Windward Islands, retiring in 1869. During his residence at the Cape he was in frequent correspondence with the late Sir William Hooker, chiefly on questions relating to the ferns of that Colony (of which he sent specimens to Kew), but also with reference to contributions of museum objects, living plants, and seeds.

Perhaps his greatest service was the share he took in promoting the *Flora Capensis* of Harvey and Sonder. This is commemorated by Professor Harvey in the preface to the third volume :—

"Nor can the authors close this preface without a tribute of gratitude to Rawson W. Rawson, Esq., late Colonial Secretary and now Governor of the Bahamas. To the active interest which from the first Mr. Rawson took in their undertaking, and to his powerful advocacy in the Colonial Parliament, are greatly due the very existence of the Flora. Nor was his assistance limited to the greater acts of patronage which became his station, but extended to the smallest details, such as the forwarding of parcels, &c. : in every detail and on every occasion he was invariably kind and considerate."

Sir Rawson Rawson is commemorated in systematic botany by *Rawsonia*, a genus of Bixaceæ.

Botanical Magazine for October.—*Lonicera hildebrandiana* is a magnificent species from the Shan Hills and Munnepore, having been discovered in the latter locality by Dr. George Watt in 1882. It has also been met with in Dr. A. Henry's recent collections from Yunnan. It first flowered in the British Islands in the Royal Botanic Gardens, Glasnevin, but the drawing was made from a plant which flowered at Kew and which was raised from seed sent by A. H. Hildebrand, Esq., C.I.E., in 1894. *Kalanchoe thyrsiflora*, a native of South Africa, was first introduced into the gardens of Thomas Hanbury, Esq., at La Mortola, and seeds were distributed by him to various botanic gardens. The specimen figured was grown in the Botanic Garden, Cambridge. Its flowers are bright yellow, arranged in a dense erect thyrsiform panicle. The interesting *Stylidium crassifolium* was raised from seeds sent to Kew from South-western Australia by Quartermaster-Sergeant B. T. Goadby, of the West Australian Engineers. It is distinguished by long radical leaves and an inflorescence, sometimes 2 ft. long, of rose-coloured flowers. *Berlandiera tomentosa*, a pretty Composite from the Southern United States, was also raised from seeds, these having been received from the Rev. L. H. Lighthipe, of Jacksonville, Florida. Its flower-heads are $1\frac{1}{2}$ to 2 ins. in diameter; the ray florets broad, and deep yellow. *Rhododendron dilatatum*, a Japanese species, is very closely allied to *R. rhombicum*. The Kew plant was procured from the Yokohama Gardeners' Association.

Botanical Magazine for November.—*Cyphomandra betacea*, commonly called the Tree Tomato, is a native of New Grenada and Peru, while as a cultivated plant valued for its edible fruit it is met with in various tropical and sub-tropical countries. It has been included in the Kew collection probably from the date of its introduction into England in 1803, and a fine specimen in the Temperate House now produces an abundant crop of ovoid orange-yellow fruits. *Carludovica laucheana*, also a native of

New Grenada, was distributed as *Salmia laucheana* by its introducers, Messrs. Sander & Co., of St. Albans, from whom the Kew plant was received. Its spadix has a curious appearance, due to the long, white, filiform staminodes, four of which are present in each of the numerous female flowers. *Hidalgoa Wercklei* chiefly differs from the only two species hitherto known in the more compound leaves. In its climbing habit and brilliantly coloured flowers, it resembles some *Mutisias*; but it is really closely allied to *Dahlia*. Kew received the plant figured from Mr. John Lewis Childs, of New York, who recently introduced it into cultivation from Costa Rica. *Begonia hemsleyana* was discovered by Dr. Henry in Yunnan. It is a new species and is remarkable in being the only known representative of the genus in the Old World with palmatipartite leaves. *Rhododendron modestum* is an exceedingly pretty new species from the Sikkim Himalaya. It appeared at Kew amongst some young plants raised from seed received from Calcutta as *R. pendulum*; but it is quite distinct from that species, and is probably nearest allied to *R. barbatum*.

New Works.—During the past year the important although not showy task of putting the working departments of the establishment into efficient order has been vigorously prosecuted by Her Majesty's Office of Works. The first step in that direction was taken in the preceding year, and the results were recorded in the *Kew Bulletin* (1898, pp. 338, 339).

The following is a list of what has since been accomplished :—

I. *Melon Ground.*—This derives its name from its former use when the frame ground of the Royal Kitchen Garden, which was abandoned by Her Majesty in 1846 and annexed to the Royal Botanic Garden. It is now the principal propagating department. No. XVIII. has been entirely rebuilt on the present Kew system of steel and wood construction. It was originally a Peach House, and a section of it is figured in Philippar's *Voyage Agronomique en Angleterre* (1830, tab. xvi., fig. 2, p. 141). The lean-to roof has now been converted into a three-quarter span. Although greatly dilapidated, much of the massive timber used in its construction was still perfectly sound. Some of the Memel Pine (yellow deal) was still perfectly sound, although it had probably been in position little less than a century. Matured pine of this kind and of great age is not now procurable. The house is divided into three compartments: one serves as a hospital for restoring to health stove plants out of condition ; the other two are forcing houses for supplying the Conservatory No. IV.

Besides this the *Mess-room* and *Tool-sheds* used by the labourers working in the northern part of the establishment have been removed from the back of Museum No. III., a position too remote from the working centre for economy of labour. A commodious office for the foreman of the decorative department has been erected. Minor appliances are an unheated span frame (84 feet long), a shed for artificial manures, another for trucks and barrows, and bins for different kinds of soil.

II. *Works' Depôt.*—This has been removed from its inconvenient and contracted position on the south side of Kew Green adjoining Cambridge Cottage to the side of Kew Palace. Commodious workshops have been provided partly by the conversion of existing out-buildings formerly belonging to the Palace, partly by the erection of new ones.

III. *Orchid-House Yard.*—This has been re-arranged. A new entrance has been made, and a proper equipment of bins for soil, a water-tank, etc., have been provided.

IV. *Herbaceous-ground Yard.*—A new north frame for alpines, 140 feet long, has been provided to take the place of others which were completely dilapidated.

V. *South Nursery.*—Two new pits have been provided :—one, single and 48 feet long; the other a span, 67 feet long, and heated.

VI. *Water Supply.*—The severe effect on Kew of the recent series of dry summers was described in the *Kew Bulletin* for 1897 (pp. 334–6). It has been found necessary to even further extend the system of service-pipes for distributing water throughout the establishment. Further additions have in consequence been made, more especially in the Herbaceous Ground, the Rhododendron Dell, and the Arboretum.

In order to reinforce the power at the pumping station, a new high-pressure boiler has been fitted in the engine-house.

VII. The *Economic Houses* (Nos. XI. and XII.) which were erected in 1869 have been re-constructed on the mixed steel and wood principle. The roofs have also been furnished with a lantern.

Cydonia sinensis.—This quince was admirably figured and fully described by A. Thouin (*Annales du Muséum d'Histoire Naturelle de Paris*, xix., p. 144, tt. 8 et 9) in 1812, from trees cultivated in the Jardin des Plantes. According to Thouin, this tree was introduced from China into England and Holland at some time during the last decade of the eighteenth century, and the individuals cultivated in Paris were obtained by Messrs. Cels and Noisette from the countries named. But we find no record of it either in the English horticultural or botanical literature of that period. Lindley seems to have been the first (1825) to publish an account of it in this country (*Botanical Register*, xi., t. 905, under the name *chinensis*); and he states that he had examined ripe fruit, containing perfectly-formed seeds, produced in the neighbourhood of London; but he only figures a flowering specimen. He describes it as a handsome, hardy, small tree, but goes on to say that it is damaged by spring frosts. Don and Loudon (1832 and 1838) seem to have had no personal knowledge of this species of *Cydonia;* the latter merely copying the description of the former. When it disappeared from English gardens, if it has done so entirely, is uncertain;

but it must be long since it was in cultivation at Kew. On the Continent, and especially in the Mediterranean region, it appears to have held its own from Thouin's time down to the present day ; and specimens of the fruit brought by the Director from the garden of Commendatore Hanbury at La Mortola, near Ventimiglia, revealed the fact that the quince long cultivated at Kew under the name of *Cydonia sinensis* is not the true plant, which is characterised by having ovate-lanceolate leaves furnished with glandular teeth and glandular hairs on the petioles, and a cylindric fruit, 5 to 7 inches in length. Besides the original figure, cited above, there is one in Duhamel's *Traité des Arbres et Arbustes*, vi., t. 75 (1808–1835) ; another in the *Herbier Général de l'Amateur*, ii., t. 99 (1817), and a third in the *Revue Horticole*, 1889, p. 228. In the last both flowers and fruit are in colours. It is there stated that the climate of Paris is rarely sufficient to bring the fruit to maturity ; it is not surprising, therefore, that it has disappeared from the neighbourhood of London.

When compiling the Enumeration of Chinese Plants (*Journal of the Linnean Society*, xxiii., p. 256) in 1887, with very imperfect material before us, we took it for granted that the plant cultivated at Kew was a variety of *Cydonia sinensis*, although, as there noted, it had much narrower, less hairy leaves than that originally described and cultivated. Following Bentham and Hooker's *Genera Plantarum*, *Cydonia* was reduced to *Pyrus*, and *C. sinensis* was named *Pyrus cathayensis*, Hemsl., because the names *sinensis* and *chinensis* had been applied to at least three or four species of *Pyrus* proper. On the whole it seems better, in accordance with the views of many contemporary botanists, to restore *Cydonia* to generic rank, and the species under consideration is then correctly designated *Cydonia sinensis*, Thouin (syn. *Pyrus sinensis*, Poir. in *Lam. Encycl. Suppl.*, iv., p. 452, non Lindl. nec Auct. alior. plur. ; and *Pyrus cathayensis*, Hemsl., *loc. cit. pro parte*). Thouin, under his original description, cites the names *Pyrus sinensis*, Mus. Par. and *P. Cydonia sinensis*, Wiegers, as synonyms.

The plant cultivated at Kew under the erroneous name of *C. sinensis* may be called *C. cathayensis*, Hemsl. Dr. A. Henry has sent specimens of the same species direct from China, and a figure and description of it will appear in Hooker's *Icones Plantarum*, plates 2,657 and 2,658.

W. B. H.

Oxalis esculenta.—Under this name there appeared in *Dr. Neubert's Garten-Magazin*, 1898, 196, a figure of the tubers of an *Oxalis* which was recommended for cultivation in lands which had become no longer suitable for potato-growing. A quantity was procured and grown in the open ground at Kew ; the species proved to be an old and well-known garden plant, viz., *O tetraphylla*, Cav. (O. Deppei, *Schlecht.*), a native of Mexico.

The tubers should be planted in spring, from 3 to 5 inches apart, taken up in November and stored in dry sand in a cool

place free from frost. They should be cooked in salt water and served with melted butter and cream. The writer in the publication above quoted says they are "as good as artichokes."

Wissadula rostrata.—This is a malvaceous undershrub, native, originally, of the West Indies and South America, and occurring also in Tropical Africa (perhaps introduced), and naturalised in India. Roxburgh (*Flora indica*) says:—"the bark of this abounds in serviceable flaxen fibres, and as it shoots quickly into long single twigs, particularly if cut near the earth, it answers well for procuring the fibre of a good length for mat factories."

Under the synonymous name of *Abutilon periplocifolium* it has been made the subject of experiment by Mr. Hart, the Superintendent of the Royal Botanic Gardens, Trinidad. The following correspondence gives the result.

SUPERINTENDENT, Royal Botanic Gardens, Trinidad, to ROYAL GARDENS, Kew.

Botanical Department, Trinidad,
October 10, 1899.

SIR,

AMONG our experiments is one made with *Abutilon periplocifolium* to determine if possible whether it can be profitably grown as a fibre plant.

I send a case of specimens, part of which I should be glad if you would utilise for your Museums, and part I should be glad if you would submit to some of your friends for valuation, both as strippings and when retted. Two stems are sent to show how straight they grow, and how easily the stripping can be performed.

1. Seed sown March 15th, 1899.
2. Crop cut April 28, 1899.
3. Yield per acre, raw strippings, dried (as sent), 1,089 tons.
4. Yield per acre of clean bast fibre, 9¼ cwts.
5. Cleaned material retted four days, then scraped and dried.
6. Clean material, 42 per cent. of raw strippings.

I am, &c.,

(Signed) J. H. HART.

The Director,
Royal Gardens, Kew.

Messrs. IDE AND CHRISTIE to ROYAL GARDENS, Kew.

72, Mark Lane, London, E.C.,
November 8, 1899.

REPORT.

WE have examined the undernoted and find as follows:—

Abutilon periplocifolium from Trinidad:

1. Bundle raw skins, no value.

Fibre from above :—Length very good ; colour good, white ; strength poor ; preparation imperfect ; similar to China Jute but softer ; value per ton, £15 16*s*. Will sell fairly well. Suggest trial 50 tons promptly.

(Signed) IDE & CHRISTIE,
Brokers.

Musa Ensete.—James Bruce's travels in 1768 to 1773, to discover the sources of the Nile, led to the discovery of a number of remarkable plants, of which he gave exceedingly good figures, though he declined to accept the views of his botanical friends on their affinities. Among them was *Musa Ensete*, which he describes under the name now adopted as specific (and subsequent writers as Ansett), and adds : "Some who have seen my drawing of this plant, and at the same time found the banana in many parts of the East, have thought the Ensete to be a species of *Musa*. This, however, I imagine, is without any sort of reason." In 1852, and again in 1853, Mr. Walter Plowden, then H.B.M. Consul at Massuah, sent plants of this *Musa* to Kew, but they did not arrive in a living state. Later in 1853 he sent seeds, from which plants were raised, one or more of which flowered in 1860, and a figure of the species was published in the *Botanical Magazine* for January, 1861 (tt. 5223-5224). In five years, in one case, in another, in three, these plants attained a height of nearly 40 feet to the summit of the foliage ; the blades of the leaves being 17 to 18 feet long. From the description in the *Botanical Magazine* it would appear that ripe fruit and perfect seeds were produced at Kew ; but it is more probable that that part of the description was made from the material supplied by Mr. Plowden. At all events the fruit is very little known in this country, and it is also imperfectly and incorrectly described in the monograph of the genus. Indeed, we know of no illustration of a fully developed infructescence, and nearly all the published figures of the habit and flowers have been copied from the *Botanical Magazine*. But what gave rise to this note was an application to Kew from several persons for the name of the fruit of a *Musa* cultivated in the Azores. Only single fruits—not a whole cluster or complete infructescence—were sent, and therefore the species could not be determined with certainty. Subsequently, Mr. J. B. Thomas, of Covent Garden, sent an entire cluster of fruit, from the same source. This is almost spherical in shape, and was originally nearly 3 feet 6 inches in circumference, borne on a peduncle about 6 inches in diameter. The weight, after hanging a fortnight in a very dry chamber, was 20 pounds. The largest of the individual fruits were 3 inches long, and nearly an inch and a half in diameter in the thickest part. Very few of them contain mature seeds ; the total number in the cluster being between 500 and 600. The pericarp is not coriaceous, as it has sometimes been described, but tender, soft, watery and tasteless, and in colour and consistence similar to a rotten apricot, as described by Bruce himself. It is quite uneatable (*see* H. H. Johnston, *Kilimanjaro Exped.*, p. 332). On the other hand, it may be mentioned, the interior or

axis of the plant, before the flowering period, is one of the best of all vegetables, and is, or was, an important article of food in Abyssinia.

A figure of Mr. Thomas's specimen was given in the *Gardeners' Chronicle* for 1900 (xxvii., p. 69, fig. 22).

The Flora of Roraima, British Guiana.—Roraima, that picturesque and interesting mountain, visited by so many naturalists, but the summit of which till late years had remained inaccessible, is now partly within the recognised boundaries of British Guiana. It was partially explored by Sir Robert Schomburgk in 1838, when he discovered, among other things, the remarkable *Heliamphora nutans* (Sarraceniaceæ). In company with his brother, Dr. Richard Schomburgk, he visited the same region again in 1842. Since then various travellers have been there; some for scientific purposes; others for the commercial exploration of its singular and varied natural productions. In 1884 another exploring expedition, in which Everard im Thurn, Esq., C.M.G., took part, spent some time in investigating the botany and zoology of this remarkable sandstone monument, which he was the first to ascend; and the botanical results were published by Prof. D. Oliver in the *Transactions of the Linnean Society, Botany* 2nd series, ii., pp. 249–300, tt. 37–56. In this paper three new genera and upwards of 50 new species are described. It was hardly to be expected that subsequent expeditions should be so fruitful in novelties; yet Messrs. F. V. Mc Connell and J. J. Quelch, who were there in 1894 and 1898, brought home a collection of dried plants hardly less rich in novelties, which are now being worked out at Kew, and will be published in the *Transactions of the Linnean Society*, illustrated at the expense of Mr. Mc Connell. This compact little collection consists of about 360 species, including one new genus of Compositæ and 70 new species. Among the most interesting are new species of the genera *Passiflora*, *Didymopanax*, *Sciadophyllum*, *Didymochlamys*, *Heterothalamus*, *Stifftia*, *Ardisia*, and *Lisianthus*.

The Flora of St. Vincent, West Indies.—In the *Bulletin* for 1893, pp. 231–296, an enumeration is given of all the flowering plants and ferns known to inhabit the island of St. Vincent, and, as there explained, our previous knowledge of the flora of the island was almost entirely due to the labours of the Rev. Lansdown Guilding. Comparatively little is known of the life of this gentleman, who was a correspondent of the late Sir William Hooker. It is supposed that he was born in St. Vincent, and from a letter in the Kew correspondence, written by his brother John, it appears that he died in Bermuda on the 22nd of October, 1831, at the early age of 33. He was evidently an ardent naturalist and a skilful draughtsman and colourist. A number of his drawings were reproduced by Sir William Hooker in the *Botanical Magazine* and other publications. Noteworthy among them are the admirable figures of the Bread fruit (*Bot. Mag.*,

tt. 2869–2871). Another may be mentoned, namely, *Guildingia psidioides* (Hooker's *Bot. Miscel.*, i., p. 122, t. 30), now reduced to *Mouriria*. L. Guilding was also the author of a number of papers on various branches of natural history, and he had collected materials and made drawings with the intention of publishing a Fauna of St. Vincent. Indeed, from the correspondence preserved at Kew, he must have made very extensive collections, which his widow subsequently brought to London for disposal. His brother, in the letter referred to above, states that he valued his museum at £10,000. So far as we know, the whole of his collection of dried plants was acquired by Sir William Hooker, and they now form part of the Kew Herbarium. After the lapse of 70 years, two large volumes of his botanical drawings have come to light, and have been purchased from a grandson, and presented to Kew by the Bentham Trustees. They consist largely of economic plants, including a number of varieties of the bread-fruit, and are beautifully executed. There are also among them the original drawings of views in the Botanic Garden of St. Vincent, which served to illustrate Lansdown Guilding's guide to the garden.

The New Territorial Arrangements in the Pacific.—Consequent on the agreement between the Governments of the United States of North America, of Germany, and of England, there are some important changes in the respective spheres of influence in the Pacific. England renounces all claims on the Samoan or Navigators' Islands, and, in exchange, has obtained protectorate rights over the Tonga or Friendly Islands, and two additional islands, Choiseul and Ysabel, of the Solomon group. Dr. F. Reinecke anticipated Mr. W. B. Hemsley in a Flora of the Samoan Islands (Engler's *Botanische Jahrbücher*, xxiii., pp. 237–368, and xxv., pp. 578–708), the latter being engaged on the same subject when the first part of Dr. Reinecke's work appeared. From comparisons made, Kew probably possesses a number of plants not included by Dr. Reinecke; on the other hand, his enumeration contains some evidently not represented in the Kew Herbarium. The Kew collections from the Samoan group, were, to a very large extent, made some 20 years ago by the Rev. Thos. Powell, whose excellent specimens are accompanied by copious notes. It is unfortunate that the general work of the Herbarium prevented the earlier elaboration of the results of his exertions. However, there are few plants peculiar to this group of Islands. The same may be said of the Tonga group; an account of the Flora of which, by Mr. W. B. Hemsley, will be found in the *Journal of the Linnean Society*, xxx. (1894), pp. 158–217. Shortly after this paper was in print, Kew purchased a collection of plants made in the island of Vavau by C. S. Crosby, Esq., M.A., Cantab. This has been partially elaborated by Mr. I. H. Burkill; but more pressing work has prevented its completion and publication. Mr. Hemsley's enumeration contains 290 species of assumed indigenous vascular plants, but very few of these were from the island of Vavau.

Mr. Crosby's collection adds a considerable number of species undoubtedly indigenous to the Friendly Islands, and at least

half-a-dozen that have been regarded as previously undescribed. Widely different is the Flora of the Solomon Islands, which is rich in singular endemic species, and also contains some of the specially Polynesian types only known to exist elsewhere in such distant parts as the Society Islands. For what is known of this interesting Flora, Kew is principally indebted to H. B. Guppy, Esq., M.B., author of *The Solomon Islands and their Natives*, in which work will be found, pp. 280–307, an interesting account of the vegetation and vegetable products, and a list, furnished by Kew, of the plants collected by the author. Since that date (1887), many interesting additions have been made to the flora by some of the officers, Lieutenants B. T. Somerville and S. Weigall, of H.M.S. "Penguin," and the Rev. R. B. Comins, who, in spite of arduous missionary duties, has made many noteworthy botanical discoveries. Some of the principal novelties will be found described in the *Bulletin*, 1894, pp. 211–215 ; 1895, pp. 132–139 ; in the *Journal of the Linnean Society*, xix., pp. 293–297 ; xxx., pp. 163–165, and 211–217 ; in the *Annals of Botany*, v., pp. 501–508, and vi., pp. 203–210, and the *Journal of the Linnean Society*, xxxii., pp. 479–489. Most of the articles are illustrated.

Jamaica Botanical Department.—A detailed account of the history and organisation of this important Department is given in Dr. Morris's "Report on the Economic Resources of the West Indies" (*Kew Bulletin, Additional Series*, I., pp. 137–148).

The following account of the recent work of the Department is taken from the last report of the Jamaican Government presented to both Houses of Parliament :—

EXTRACT from Colonial Reports, Annual, No. 283, Jamaica, Report for 1898–9, pp 31–32.

The Botanical Department did useful work during the year in experimental cultivation, in the distribution of plants and seeds, and in affording information by means of bulletins and private correspondence with planters.

The Department distributed during the year no less than 197,139 plants, of which the greater proportion were economic plants.

Advice was given during the year to orange growers as to remedies for sickly plants, to cocoa planters by leaflets and demonstrations by the Agricultural Instructor of the Department, to viticulturists through the Instructor, whose advice given during the last few years has resulted in remunerative cultivation of grapes for the home market in a dry district of St. Elizabeth, hitherto considered of little value for agricultural purposes, to sugar planters by distributing the best varieties (the "No. 95" variety having afforded a planter more than double the yield of the kind hitherto grown on his estate), to tobacco cultivators by obtaining the best kinds of the famous Vuelta Abajo tobacco, with which the Hon. Evelyn Ellis exclusively planted out 60 acres, manufacturing tobacco which realized a high

price in New York. This has induced him to lay out 130 acres more. The Department has also had under training two lads from the Colony of Lagos, and has trained as agriculturists several lads from the Hope Industrial School.

A scheme for starting an experimental agricultural station was formulated during the year by the Botanical Director, the Agricultural Inspector, and the Principal of the High School at Hope for the employment and instruction of industrial school boys, and of boys whose parents are willing to pay for their maintenance. The scheme was approved by the Government, but cannot at present be carried out for want of funds.

The great rise in the beginning of 1899 in the price of quinine and cinchona bark led to an enquiry into the present condition of the cinchona plantations and the practicability of manufacturing quinine locally as in India. As a result it appears doubtful, unless prices rise still further, whether bark can be harvested for sale, or quinine manufactured locally, as a source of profit.

Grape Fruit.—A brief notice of this fruit which has become an important article of export from the West Indies to the United States, where it is very popular, was given under the head of Bahamas in the *Kew Bulletin* for 1898 (p. 180).

The following further particulars are taken from Dr. Morris's "Report on the Economic Resources of the West Indies" (*Kew Bulletin, Additional Series*, I., p. 150) :—

"The grape-fruit is a member of the orange tribe that has lately come into great favour in the United States. It is a fruit allied to the shaddock (*Citrus decumana*), but smaller, and with a finer flavour. It is regarded as very wholesome and refreshing, and possessing valuable tonic properties. Fortunately trees yielding this fruit were already plentiful in Jamaica, and the island was at once able to meet the demand. Last year the value of the exports was nearly £6,000. It is probable that it may eventually be more profitable to grow the grape-fruit than the orange."

A question has arisen as to whether the grape-fruit, being apparantly only a cultivated race, would come true from seed. The following letter seems conclusive on this point :—

F. B. Archer, Esq., M.B., C.M., Barbados, to Commissioner of Agriculture for the West Indies.

Culloden, St. Michael,
October 21, 1899.

Dear Dr. Morris,

With reference to our conversation about grape-fruit, my experience is as follows :—

When in Demerara some years ago I tasted some most delicious ones at Mrs. Jacobson Hill's, grown in her own garden. I very much desired a plant, and she gave me some of the fruit so that

I could plant the seeds, but I told her very likely they would not come true. I planted the seeds here, and have five trees which have borne fruit twice or more, and to my delight they come true to the parent plant.

They are as fine or finer than any grape-fruit I have ever tasted.

I got no fruit last year on account of the storm, and for some reason they are not bearing this year, but should they give any fruit next year you shall taste for yourself.

I am, &c.,

(Signed) F. B. ARCHER.

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